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EFFECTIVE USE OF FEDERAL LABORATORIES

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Forward

The Subcommittee on Science, Research and Development of the Committee on Science and Astronautics, House of Representatives, initiated a series of hearings on the utilization of Federal laboratories beginning March 26, 1968. The primary question being examined is, "How can we make the best use of our existing Federal laboratories?"

The Subcommittee is exploring such issues as how to use or redirect a laboratory's capabilities when it essentially has completed its assigned mission. What policies or procedures foster or hinder an agency of Government making use of the capabilities existing in a laboratory funded by another agency? How can, or should, mission-oriented laboratories be responsive to national problems -- such as transportation, housing or crime -- in which they may have a capability? To what extent should laboratory directors have funds available to respond to new areas of opportunity, and what guidelines are there to determine if new laboratories should be created to respond to new missions or if the job can be handled within existing laboratories.

This memorandum covers the prepared statement of Dr. Donald M. MacArthur, who represented the Director of Defense Research and Engineering at these hearings. Also included is a statement by Mr. Daddario, Chairman of the Subcommittee, on the purpose of the hearings.

STATEMENT OF MR. DADDARIO

ON

THE PURPOSE OF HEARINGS*

"Mr. DADDARIO: Mr. Speaker, on Tuesday morning, March 26, the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics will begin 6 days of hearings on the utilization of Federal laboratories.

"The two decades following World War II have seen a long-term, upward trend in Federal spending and investment in research and development. Beginning with $900 million for fiscal year 1947, obligations for research and development are expected to total $17.8 billion in fiscal year 1969. During this same period, obligations for research and development facilities and fixed equipment increased from $71.4 million for fiscal year 1947 to a high of almost $1.2 billion in fiscal year 1963, and the fiscal year 1969 budget request contains $754 million for this purpose.

"Based upon figures of the National Science Foundation shown in its latest report on Federal funds for research and development, a total of $11.6 billion has been obligated for facilities and fixed equipment for fiscal years 1947 through 1968. Moreover, this figure does not include the very real investment in recruiting and training the scientists and engineers who man the laboratories or the cost for laboratory maintenance and repair, so that our total investment to date in Federal laboratories is actually substantially more than $11.6 billion.

"I believe the time has come when the scientific and technical needs of new programs or new agencies should not be filled simply by building and staffing more and more laboratories. We must realize that our resources assignable to science and technology are not infinite, and that they must be kept within respectable limits. Yet within these limits, we must still accommodate the new demands for research and development. Problems of environmental pollution, crime control, transportation, and education all depend heavily upon advances in science and technology.

"We have come to the point where Congress must seriously inquire into the alternatives to building new laboratories. We must discover how we can best use our existing competence, and how Federal laboratories--whether Government or contractor operated--can be more responsive to the problems facing our Government.

"Questions concerning the use of our laboratories are going to be with us for some time. But we are entering a new phase of the relationship between science, technology, and Government, and these questions must be faced.

"Beginning on March 26 the Subcommittee on Science, Research, and Development plans to receive testimony from the President's Office of Science and Technology, from laboratory directors, from agencies that have large laboratories, and from some of the newer agencies with research and development needs

* Congressional Record - House, H.2185, March 25, 1968

We expect also to explore how Federal laboratories can be more responsive to the needs of law enforcement officials.

"A great deal more must be done to understand the causes of crime and the effects of various deterrents, and I hope the subcommittee will be able to go into this behavioral science aspect of crime later in the session. In the meantime, however, these hearings will concentrate on applying our capabilities in the physical sciences to crime prevention and control.

"For example, the President's Crime Commission identified computer technology and systems analysis as one of the most promising and important areas, and it would appear that the capabilities inherent in our space and defense programs would have direct application. Similarly, transfers of technology would be apparent in the fields of communications and fingerprint identification. More importantly perhaps, Federal laboratories could provide the bridge between police needs and existing technology by providing testing and evaluation services which an independent police force may be unable to accomplish.

"In general then, the principal issue that the subcommittee plans to discuss during these hearings is how can we make the best use of our existing Federal laboratories? We expect to go into such issues as how to use or redirect a laboratory's capabilities when it essentially has completed its assigned mission. What policies or procedures foster or hinder one agency of government making use of the capabilities existing in a laboratory funded by another agency? How can, or should, mission-oriented laboratories be responsive to national problems--such as transportation, housing, or crime--in which they may have a capability? To what extent should laboratory directors have funds available to respond to new areas of opportunity, and what guidelines are there to determine if new laboratories should be created to respond to new missions or if the job can be handled within existing laboratories?"

EFFECTIVE USE OF FEDERAL LABORATORIES

STATEMENT OF DR. DONALD M. MacARTHUR, DEPUTY DIRECTOR, RESEARCH AND TECHNOLOGY, OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING, DEPARTMENT OF DEFENSE, BEFORE THE SUBCOMMITTEE ON SCIENCE, RESEARCH AND DEVELOPMENT, HOUSE COMMITTEE ON SCIENCE AND ASTRONAUTICS.

Mr. Chairman, Members of the Subcommittee:

Your hearings on the effective use of Federal laboratories are both timely and pertinent to the interests of the Department of Defense. It is an important question with which we have been concerned for some time. Today I would like to review for you some of the experiences of the Department of Defense and some of the lessons we think we have learned with respect to the questions which you are addressing.

Characteristics of Defense Laboratories:

As you know, the Department of Defense has an annual RDT&E budget of about $8 billion. We employ about 60% of the civil service engineers and 35% of the civil service scientists in the Federal service. Thus, I believe that our experience in the management of R&D activities will be of some value in your discussions and deliberations.

We have 79 laboratories. In addition, there are 43 test and evaluation activities which are concerned with the evaluation of developed equipment. The FY 67 RDT&E obligations for these laboratories were $1.9 billion of which $0.9 billion (47.4%) was for actual in-house work as opposed to contract work. These laboratories employ about 72,000 people, of which 25,000 are scientists and engineers. Our investment in laboratory physical plant and equipment is about $2.2 billion based upon acquisition costs.

As you can see, this is quite an investment and we are quite anxious to see that it is managed judiciously and effectively and utilized in an optimum manner. This was a major reason for establishing our Office of Laboratory Management in 1965 which I will discuss later. In some respects, we have addressed many of the same questions (but on a smaller scale) which are before this Committee, in order to assure that the capability of all of our laboratories are available for the highest priority needs of the three Military Departments and the six Defense Agencies.

I am not sure that we can examine laboratories in a meaningful way unless we place them in proper perspective, with respect to the other four types of performers we depend upon in the DoD to accomplish our mission. Our laboratories represent about 12% of our obligations: industrial firms, 68%; colleges and universities, 12%; non-profit organizations, 5%; and Federal

Contract Research Centers, 3%. Each of these organizational types has a relatively unique, although not mutually exclusive, role to play in satisfying DoD requirements.

We have often asked ourselves the question, "Why do we need in-house laboratories?" Among the evident reasons underlying their need are:

1. The maintenance of national competence during peacetime, as well as times of conlfict, in those areas of technology peculiar to military needs.

2. The necessity for maintaining a continuity of effort, free from commercial pressures and directed toward the conception and evolution of advanced weapon systems.

3. The need for competent in-house skills that can direct, monitor and assess the performance of DoD contractors.

4. The requirement of having available to the Military Services a fast-reaction capability to solve critical, immediate problems that arise in connection with existing operational weapon systems, or when unexpected combat situations are encountered such as that currently existing in Southeast Asia.

DoD Actions to Improve the Effectiveness of Laboratories:

Many of the others who have testified before this Subcommittee have highlighted many of the administrative problems of Federal Laboratories. We have had our share of them also.

During the past two years we have had a concerted effort under way to improve the effectiveness of our in-house laboratories. The problems of our laboratories as we saw them when we started this effort can be stated rather simply:

1. Many laboratories have not been as heavily involved as they should be in the over-all weapon planning process and in urgent military problems.

2. In many cases the laboratory structure was too fragmented to take on meaningful programs in an integrated way.

3. They did not possess the administrative flexibility to respond rapidly to changing needs, the changing state of technology and changing nature of new tasks.

What are the rudiments of our strategy for dealing with these questions? We have attacked these problems, quite successfully I might add, by:

a. Assigning important military missions and weapon planning responsibilities to major laboratories.

b. We are taking some steps and planning orders to restructure fragmented organizations into more cohesive structures and centers with more meaningful missions.

c. We have identified a number of administrative problems which inhibit the effectiveness of Defense laboratories and have worked hard to develop solutions for them.

I would like to insert for the record, as Tab A, more detailed information on the steps we have taken or which are under way.

We are very encouraged over the progress we have made on a number of long-standing problems. This task has to be a continuing process of appraisal and action as there really is no finite solution. We hope to continue our rate of improvement and to be able to adjust to our changing patterns and needs. Otherwise we will retrogress.

A great deal of our energy is involved in the management of Defense activities in support of our three Military Departments and the Defense Agencies. There is a continual ebb and flow of new goals and requirements similar to that for the total Federal establishment. We have been involved for some time with the same basic questions with which you are concerned. Are we using the Laboratory capacity we have without regard to Service loyalties? What patterns of growth should we permit or foster? How much should we perform in-house? On contract? How should the laboratories be structured? What should their relationships be within their parent Service? To other Services or Defense Agencies? I know that we have been able to develop many useful answers to these types of questions, but I will be the first to admit that we don't have all of the answers.

Within the DoD we have many examples of a laboratory performing functions for other Services. Here are but a few of a great many examples. The Army's Natick Laboratory has the R&D responsibilities for food development for the Navy and Air Force. The Army's Harry Diamond Laboratory is providing the fuzing and arming for the Navy's Poseidon missile. The Air Force's Materials Laboratory has provided the thermal coatings for the Navy's Transit Satellite. The Army's Frankford Arsenal develops for the Air Force actuating devices for such applications as ejection seats.

Some of these arrangements are traditional, some are based upon a search by the customer for competence and still others are motivated by the policy levels within the Services. We, within ODDR&E, also play an important role in this respect. We manage the Defense RDT&E program which determines to a great degree the financial support of laboratories. Financial control provides important leverage in placing corporate policies into effect. We are also in the mainstream of decision-making with respect to capital investments, such as military construction. Facilities are the life blood of expanding laboratories and control over them determines a laboratory's destiny. Through authority such

as this, we can influence the nature of our laboratory system, the characteristics of individual laboratories and centers and the interaction of these organizations with other Defense organizations.

Last year we closed three laboratories and consolidated four others. These actions are part of a continual appraisal of our laboratory system in terms of the changing pattern of Defense needs. Although we have moved out aggressively in trying to fashion a viable laboratory system, there are some negative aspects also which have caused us some concern and difficulties. For example, several of our attempts to consolidate fragmented activities required movement of people to different geographical locations. We have learned that many people develop deep roots and will not move with their functions. As a result, the DoD has lost some important expertise. In one case not a single professional moved when his laboratory component was moved. On the average about 50 - 60% of the professionals prefer to remain in their current locale. We try to take personnel factors such as this into account in our decision-making regarding consolidations.

Support on Non-Defense Agencies:

The performance of work on a reimbursable basis has been rather significant within the DoD both among the Services, as I indicated earlier, and particularly with the AEC and NASA. We interact continually with other Government agencies both on a reimbursible and a non-reimbursible basis.

For example, the AEC program includes $849 million for military applications to support our nuclear weapons and Naval reactors programs, which represents 35.1% of their total budget. AEC laboratories are involved in many of our conventional weapon programs in such fields as explosives research and aspects of personnel armor development. We have had many Defense personnel actively working in AEC facilities and there are many interactions between the Special Weapons Center and the Weapons Laboratory of the Air Force with the Los Alamos Scientific Laboratory and Sandia Corporation, which are located nearby.

We are closely allied with NASA in many aspects of their space and aircraft programs and use each other's talent and unique facilities quite freely. Our national ranges have NASA as a principal customer. They use our unique facilities at Tullahoma and they perform a great deal of research in aerodynamics, structures and propulsion at NASA Centers, which is directly utilized by DoD. A number of our systems and sub-systems have been adopted by NASA in connection with their launch vehicles and they have developed a number of critical components for our MOL program. We performed services in FY 67 for NASA estimated at $400 million.

I would like to submit for the record a few examples of programs carried out by our laboratories for agencies other than NASA and AEC.

How do Agencies get together on programs? Like most areas of government activity it depends on aggressive individuals who know their problem and where to go for help. Our job is to let other agencies know what capabilities we have

As an example we publish an annual report which summarizes information on each of our "In-House RDT&E activities". These are distributed through the Federal Council on Science and Technology, DDC and the Commerce Clearing House to other Agencies. Also each of the Services has developed a "Technical Facility Capability File". These assist the people with a problem in locating technical expertise, suitable facilities and major equipment within DoD. I would venture to say that any individual looking for special capabilities in DoD could locate them with a minimum of two or three telephone calls.

I recognize the Committee is interested in National Policies for Use of Federal Laboratories. We feel that we have a permissive environment with respect to the reimbursible use of other agencies' laboratories, and vice versa. We have just reviewed the pertinent laws, executive orders and other statements of policies and procedures which we believe represent our guidelines in the full and effective use of Federal laboratories. I would like to insert this review into the record.

The existing laws and executive instruments are quite permissive and encourage the full utilization of existing facilities and Federal laboratories. The so-called Economy Act of 1932 appears to be keystone legislation in this respect. Executive Order 10521 is also quite pertinent to the efficient use of Federal equipment and facilities. In addition, there exists frequently general authorization for cooperation between a specific agency and all other agencies. Such is the case with NASA, AEC, FAA and the National Bureau of Standards.

There appear to be some constraints, however, resulting from a decision of the Comptroller General in 1954 concerning the addition of new plant and equipment to accommodate interagency services. While I don't believe this has affected us seriously, it could be somewhat of a deterrent. This question should be examined further.

Interagency Transfer of Laboratories and Programs:

We have probably had as much or more experience than most agencies in the interagency transfer of laboratories and programs. I can recall two cases which are quite well known and from which we can gain some insight. A historical case in point is the transfer of fuze R&D from the National Bureau of Standards (NBS) to the Department of Defense in 1953.

During and after the end of World War II, NBS performed the R&D on proximity fuzes under the sponsorship of the Military Departments. NBS initiated action to have their Ordnance Division transferred due to the increasing magnitude of ordnance work being performed by the NBS, coupled with the apprehension that "the concurrent growth in applied engineering work might detract from the Bureau's main function in the broad areas of standards and standardization". These were considered compelling reasons for transferring the activity to the Department of Defense. This resulted in the creation of the Army's Harry Diamond Laboratory. Thus, we must always be concerned with

the balance of agency assignments and outside assignment in a given laboratory because the focus of a laboratory cannot be blurred if it is to remain a viable and productive organization.

On the other hand, there are also instances where a laboratory could be transferred from one agency to another when the laboratory mission is no longer considered vital or when a new agency requires a rapid capability to satisfy a new national goal. A case in point is the space program.

The Space Act was signed into law on July 29, 1958 and thus NASA was created. The DoD transferred Project Vanguard from ONR to NASA on October 1, 1958 and the Jet Propulsion Laboratory, on December 3, 1958. On October 21, 1959 President Eisenhower approved a plan submitted by Secretary of Defense McElroy and T. Keith Glennan, Administrator of NASA, to have part of the Army Ballistic Missile Agency transferred to NASA.

These two examples certainly represent two of a number of options available to us in assuring the full utilization of laboratories. Some consideration should also be given to a different way of handling the phasing down or closure of a Federal laboratory. When a laboratory has lost its purpose or the priority of its work has diminished or disappeared, we should offer to transfer it to another agency or at least consider assigning to it other agency work if it has retained the required level of quality. I know that some people would have reservations about a step. Their approach would be to close it down because once the laboratory has lost its purpose, it generally loses its best people first. Something can be said on both sides. There is really no magic formula. I believe one must examine this question on a case-by-case basis.

Transfer of Technology:

I also believe that we have a moral, if not a legal responsibility, to assure to the degree possible the transfer of defense developed technology to other agencies and to new programs.

Of course, one of the best technology transfer agents we have is people. Although there are a number of major technology transfer programs within the Government, one of the simplest approaches is to motivate the mobility of people. In fact, I can cite a number of cases to illustrate my point.

Dr. E. M. Reilley, the Assistant Director for Research in my office, left us recently to become the Director of Research and Development of the Post Office Department. He brings to that position all of his background in solid state and nuclear physics, computer technology, electronics and R&D management which he developed both at Ft. Monmouth and in OSD. What is almost as important is that he knows the on-going programs of the DoD and knows the laboratories and the people who can provide knowledge and inputs to important Post Office Department R&D problems.

In a similar vein, Mr. T. F. Rogers, the former Deputy Director of Electronics and Information Systems in OSD has taken the position of Director of Research and Planning in HUD. His experience at the Air Force Cambridge Research Laboratory, Lincoln Laboratory and in OSD will provide HUD the benefit of a great deal of available technology and methodology which will be directly applicable to the technical solution of urban development problems.

I also know of many other cases of transfers of people at the laboratory level from Defense to other agencies in which they have assisted in the exploitation of Defense developed technology.

Such situations are not limited solely to Government personnel. Contractors of the DoD, industry, non-profits and universities are excellent sources of expertise and performance for new agencies and new programs also. A number of our Federal Contract Research Centers are being used by civilian agencies to help define some of their problems. Many aerospace companies are actively planning or performing programs utilizing their Defense systems and technology background for HEW, HUD, DOT, OEO, etc. Others are working in the field of oceanography in support of Commerce and Interior needs, applying technology and know-how derived from Defense supported programs.

Such technology transfer mechanisms far transcend technology transfer through Information Centers. As was mentioned last year in DoD testimony before the Subcommittee on Science and Technology of the Senate's Select Committee on Small Business, there is a high degree of mobility from Defense connected industry to non-defense organizations. Our estimate is that this approaches 10,000 scientists and engineers each year. I believe that newer agencies can, with the proper motivation and judicious actions, take full advantage of these natural dynamics in the technical work force and even influence them more in the direction of their more urgent needs.

Personnel Ceilings - A Major Deterrent:

Probably the most serious deterrent to interagency work in R&D is the current system of personnel ceilings. Personnel ceilings limit the flexibility available to Federal laboratories. I believe that the elimination of manpower ceilings for cross-agency work would motivate a much greater utility of existing laboratory capabilities and would be a major step forward in achieving the objectives of this Subcommittee. I would only establish financial controls but at the same time would insist upon a meaningful after-the-fact appraisal. I also believe that others are opposed to this concept because they feel that growth would be excessive and the laboratory would lose its focus towards their prime mission. But I believe that growth would be minimal.

Guidelines for Interagency Support:

I believe in the long run if you (as an Agency) need an R&D capability, to be most effective you have to do some of it yourself--you cannot solely rely on other government agencies.

My reasons are:

(1) You need people who have your interests and priorities.

(2) You need people whom you can directly control.

(3) You need people who are working in, just not watching, the technology in areas you need.

(4) You need people who can couple R&D results to your mission.

When a new agency begins to attack a major national problem, and begins to build the necessary R&D capability, it is probably necessary for it to depend primarily on other agencies and private contractors for a few years.

But I cannot overemphasize the fact that we must exercise considerable care in assigning non-agency missions to existing labs. In our review of our own DoD labs, we found generally that those which tried "to cover the waterfront" were much less productive and of lower quality than those which were focused toward a well-defined meaningful agency problem. A key objective for our new weapon centers is a specifically defined, challenging mission. The question of balance for any single laboratory must be a decision shared by both the laboratory director and his management agency. I really don't think we should attempt to set an arbitrary figure or a range. Each laboratory director must examine his own local situation to determine the level of effort he can perform for other agencies using local criteria to make this decision.

In general for busy productive laboratories with clear cut missions, I would say the following principle applies to interagency lab support: the greater the match between the actual technical work that needs to be performed and the performer's on-going programs, the more the laboratory can assimilate Dr. McLean's example of his work for the Bureau of Fisheries on sonar signatures for schools of fish illustrates this point. For such cases, laboratories might be able to absorb 15-20%.

In specialized test facilities--like computer centers or wind tunnels--the percentage could be much higher depending on the capacity of the facility On the other hand, we must recognize that each agency will have some labs that are highly specialized; for these, as much as a 10% diversification might be unwise or even impossible.

In summary, I believe that if the motivation and need are there, people will know or find the capabilities and unique facilities and competence in Federal laboratories. We certainly encourage others to use any of our available capability. The cross-servicing of major programs should be thought out very carefully in advance, however, so that the primary mission of a laboratory is not so diluted that performance for either their parent agency or its customer or both is not degraded. Modifications to our system for accounting for manpower and manpower ceilings are in need of critical review if we are to make optimum use of our in-house capacity.

There are a number of advantages in using existing Federal laboratories instead of establishing new ones: (1) avoidance of unnecessary duplication; (2) over-all reduction in costs; and (3) the ready availability of expertise. There are a number of disadvantages also: (1) dilution of laboratory mission; (2) the lack of close coupling between the performing laboratory and the customer agency; and (3) the resultant lack of R&D continuity and experience in the new agency or program. The trade-off among considerations such as these must be weighed carefully in determining the most appropriate course of action to be taken.

The Office of Laboratory Management:

The progress we have made in the improvement in the effectiveness of our in-house laboratories stems from four factors. A continual interest of the three Directors of Defense Research and Engineering (York, Brown and Foster) in the health of laboratories; the sustained recognition of the importance of laboratories by the Secretary of Defense over the last several years; the support of the past two Directors of the Office of Science and Technology; and finally, the establishment of an Office of Laboratory Management within the Office of the Director of Defense Research and Engineering.

Within the Services, the establishment of the positions of "Director of Laboratories" (DOL) has been an important step in improving the quality of our laboratories and in bringing the laboratories into much closer interface with the policy levels.

I would like to insert in the record a brief review of the origins, present functions and some past accomplishments of the Office of Laboratory Management. Mr. E. M. Glass, the Assistant Director for Laboratory Management, who is with me, will be pleased to answer any questions the Subcommittee is interested in asking him concerning his functions and activities.

The Office of Laboratory Management is the organizational arm of DDR&E with respect to in-house laboratories. Its primary purpose is to assist the Director of Defense Research and Engineering in the planning and the execution of a positive program which assures that the Defense laboratories of the future play key roles in shaping, carrying out, and administering the complex RDT&E programs upon which our Defense posture depends so heavily. This office is the focal point of the DoD laboratories and has been heavily involved in most of the issues I have discussed today.

Thank you.

TAB A

DoD Actions to Improve the Effectiveness of Defense Laboratories

We have established new weapon centers with clear and broad responsibilities over a number of military problems and functional areas. These centers and major laboratories have been given important assignments in threat analysis and development of requirements; planning for future weapons; assessment of vulnerability of proposed major systems; and important roles in the research and development cycle. Thus the in-house laboratories are beginning to emerge not only as an R&D performer, but an important source of technical judgments and advice to the top level planners and decision makers. Here are several examples:

Underseas Warfare Center - Created from NOTS (Pasadena) and elements of the Naval Electronics Laboratory, NOTS (China Lake) and an ASW Analysis Group at NOL (White Oak). This Center will be responsible for the over-all ASW systems analyses, hardware development for surface systems, system integration of air, surface and sub-surface systems and fleet engineering support. Because of the importance of this area, we are providing for three centers devoted to ASW and associated weaponry. The Naval Air Development Center (Johnsville) has been given responsibility for hardware development of airborne ASW systems. We intend to combine organizationally the Naval Underwater Weapons Research and Engineering Station, Newport, Rhode Island, with the Naval Underwater Sound Laboratory, New London, Connecticut, to make a new center for the development of sub-surface systems. In this fashion, the major ASW systems and hardware responsibilities will be focused in three principal Navy centers.

Ships R&D Center - The David Taylor Model Basin Marine Engineering Laboratory and the Mine Defense Laboratory have been combined organizationally to create a ships' R&D center. It is responsible for advanced ships concepts, high speed ships, deep ocean vehicles from research to project formulation.

A number of fragmented activities involved in similar technologies have been combined into more viable arrangements. For example, an Army Materials and Mechanics Research Center is being created from elements of eight RDT&E activities. The Secretary has approved a long-range program to consolidate ten of the Army's medical laboratories into three major medical centers.

There are always difficult administrative problems in any large organization. We believed, however, that we had more than our fair share of them. I have always felt that if we could provide the management of our Defense laboratories with the same degree of flexibility as is possible in the high technology organizations in the private sector, we could achieve an immediate and substantial improvement in effectiveness and output. With this model as our goal, we have identified a number of administrative problems and have worked hard to develop solutions for them. A large number of the problems have either been solved or we have implemented a time-phased solution for them. We have also made a major dent in the unsolved ones. The problems run the entire spectrum from recruitment, career development and training, personnel mobility, compensation, to dealing with the marginal employee. We have had a great deal of excellent assistance from the Civil Service Commission in coming to grips with these problems.

In addition, we have been concerned with such non-personnel problems as facility modification, support services, procurement, supply and laboratory maintenance. For example, greater authority has been given to Laboratory Directors in the reprogramming of funds and personnel to adjust to changing work situations. Techniques have been developed to foster greater mobility of people among technical organizations to bring the best talent to the problems as they arise. Career development programs have been tailored to meet the specific needs of scientists and engineers.

TAB B

Some Examples of Inter-Agency Cooperation

Army

NIH and the Walter Reed Army Institute of Research jointly staff in Panama the Middle American Research Activity and carry on joint programs in indigenous diseases. The Postal Department uniforms are designed by Natick together with the research work in the textiles used in these uniforms. The Army has joint programs with the Department of Agriculture on insecticides and also joint programs between Civil Defense and Agriculture in fires and control of fires. There are also programs between AEC, Commerce and DoD in the area of irradiation of food. There are many, many civil work programs conducted by the Army Corps of Engineers for other agencies.

Navy

A number of surveys are conducted at Point Barrow by the Navy for other agencies. This is part of an Office of Naval Research (ONR) program:

Agency	Project
U. S. Geological Survey	Gravity Studies
National Science Foundation	Snow Studies
U. S. Geological Survey	Oil Shale
National Institute of Health	Arctic Biology
Federal Aviation Agency	Flight Service
Interior Department	Polar Bear Survey

Agency	Project
National Institute of Health	Marine Biological Chemistry
Department of Agriculture	Diseases of the Caribou
Public Health Service	Zoonotic Diseases
Bureau of Standards	Inospheric Studies
Coast and Geodetic Survey	Geodetic Management Surveys

Other examples of inter-agency cooperation are listed below:

National Health Institute - Pays ONR to operate the Tissue Culture at Naval Biological Lab at Okland, Calif.

Interior contributes to an Oceanographic Project of the Navy.

Other types of fund transfers:

Recently ONR transferred money to Geological Survey for specialized project - Trace Analysis in Water.

National Bureau of Standards - transfer of funds to NBS for various research projects for ONR.

David Taylor Model Basin - Navy work for Maritime Administration, Coast Guard, private sector, etc., on reimbursible basis.

In the shipbuilding business, private industry and Coast Guard - exchange of computer aided ship design.

Air Force

Work performed for FAA:

The Air Force Materials Laboratory performed a huge effort in support of the Super-Sonic Transport (SST), amounting to $[illegible] million.

The work included such efforts as the following:

Screening test program for evaluation of stress corrosion susceptibility of alloys under consideration for skin materials.

Laminating Resins.

High temperature hydraulic fluids.

High temperature seal and sealant materials.

Screening tests and evaluation of lubricants for propulsion and secondary power systems.

Performance of jet engine fuels.

Fatigue behavior of materials.

The Air Force Flight Dynamics Laboratory redesigned the nose cone of the total inflight simulator (TIFS) vehicle in support of the SST program.

The Air Force Aeropropulsion Laboratory:

Carried out an engine component development program in support of the SST.

Defined a suitable jet fuel specifications for the SST.

Defined a jet lubricant for the SST.

Investigated crash fire prevention techniques for the SST, including development of a high temperature extinguishing agent.

The Air Force Weapons Laboratory performed work to determine dose, dose rate and depth, dose patterns of high altitude radiation and its hazard to pilots and passengers.

The Aeromedical Research Laboratory performed studies to determine injury patterns arising from the use of different types of restraint harnesses.

Work performed for the Food and Drug Administration:

The Aeromedical Research Laboratory performed studies to evaluate the biological and pathological effects of drugs.

Work performed for the Department of Transportation:

The Aeromedical Research Laboratory performed work on an anthropometric definition of vehicle safety in which the relationship of size and design of passenger compartments affects safety at impact.

Work performed for the National Bureau of Standards:

The Aeromedical Research Laboratory performed dynamic testing of seat belts.

Work performed for the National Science Foundation (NSF):

The Air Force Cambridge Research Laboratories participated in a cooperative program sponsored by the NSF in Project Hailswath. The program was concerned with hailstorm modification.

The Air Force Cambridge Research Laboratories (AFCRL), participated in a cooperative program for the Cerro Tololo Inter-American Observatory in Chile. AFCRL funded the 4-inch and 60-inch telescopes and the NSF funded the domes.

TAB C

National Policies for the Use of Federal Laboratories

Much of the legislation which established the function of Department of Defense and the Military Departments contains language which either permits or fosters the use of services of other agencies.

The general authority authorizing agencies to perform work for another agency is the so-called Economy Act which states "any executive department... if it is determined by the head of such executive department... may place orders with any other such departments... for materials, supplies, equipment, work, or services of any kind that such requisitioned federal agency may be in a position to supply or equipped to render and shall promptly pay... the estimated or actual cost thereof as determined by such department... as may be requisitioned." (31 U.S.C. 686(a)). In addition, 41 U.S.C. 23 provides "all orders or contracts for work or material or for the manufacture of material pertaining to approved projects heretofore or hereafter placed with government-owned establishments shall be considered as obligations in the same manner as provided for similar orders or contracts with commercial manufacturers or private contractors.

Frequently, there exists general authorization for cooperation between a specific agency and all other agencies. For example, NASA by statute may use the services, equipment, personnel and facilities of federal agencies with or without reimbursement and on the similar

basis cooperate with agencies in the use of services, equipment and facilities. Each federal agency is also directed to cooperate fully with NASA. (42 U.S.C. 2473(6)) AEC may utilize services and personnel of another agency (42 U.S.C. 2201(f)) and the FAA has similar authority with respect to facilities, equipment and personnel of civilian and military agencies. (49 U.S.C. 1343). The National Bureau of Standards is also directed to cooperate with other government agencies in the establishment of standard practices incorporated in codes and specifications. As may be seen, there is both general and specific authority for interdepartmental cooperation to conduct research.

As far as executive statements of policy pertaining to the utilization of federal facilities, Executive Order 10521 as amended, dated March 17, 1954 is perhaps the most basic statement concerning the efficient use of federal equipment and facilities:

> "Sec. 8. To facilitate the efficient use of scientific research equipment and facilities held by Federal agencies
>
> (a) the head of each such agency engaged in scientific research shall, to the extent practicable, encourage and facilitate the sharing with other Federal agencies of major equipment and facilities; and
>
> (b) a Federal agency shall procure new major equipment or facilities for scientific research purposes only after taking suitable steps to ascertain that the need cannot be met adequately from existing inventories or facilities of its own or of other agencies and

(c) the Interdepartmental Committee on Scientific Research and Development shall take necessary steps to ensure that each Federal agency engaged directly in scientific research is kept informed of selected major equipment and facilities which could serve the needs of more than one agency. Each Federal agency possessing such equipment and facilities shall maintain appropriate records to assist other agencies in arranging for their joint use or exchange."

In addition, Executive Order 10807, as amended, dated March 13, 1959 creates the Federal Council for Science and Technology which provides as a function of the council the consideration of problems and development in the fields of science and technology including "to achieve more effective utilization of scientific and technological resources and facilities of federal agencies, including the elimination of unnecessary duplication."

Finally, the report to the President on Government Contracting for Research and Development dated April 30, 1962 (The Bell Report) also provides a basic statement concerning the role of federal laboratories in the conduct of research and development. The Bell Report has been our most authoritative source of guidance since 1963.

TAB D

The ODDR&E Office of Laboratory Management

The Office of Laboratory Management was formally established in September of 1965. The functions it assumed at the time of its establishment were performed prior to that time on an ad hoc or special arrangement basis.

Although concern for the quality and productivity of Defense laboratories goes back many years, great impetus was given to this question in 1961 when the DoD began taking a hard look at its in-house capability.

When Mr. McNamara became Secretary of Defense in 1961, he asked 120 questions to provide the basis for the future posture of the Department of Defense. Question 97 was: "Advise me ways in which to improve the operations of the in-house laboratories." To answer this question and to develop solutions to problems that might arise, a task force was set up with the title of "Task 97".

Task 97 visited many laboratories, talked to many people, and turned in a report which was endorsed by Mr. McNamara by his memorandum of 14 October 1961. In this memorandum, he reiterated the importance of in-house laboratories to furthering the Department of Defense's mission and proposed a number of positive actions to be taken by the Military Departments to upgrade their in-house capabilities. Out of this came -

1. A sensible approach to taking full and complete advantage of the PL-313 provisions and a more rational approach to compensation rates under this authority.

2. The establishment of a Laboratory Director's Fund for work judged by the laboratory director to be of promise or importance, with only after-the-fact review by higher authority.

3. The pinpointing of responsibilities with the Assistant Secretaries (R&D) of the Military Departments for the health and environment of the in-house laboratories.

However, other actions recommended were not implemented as readily. These included: (1) that Department of Defense (DoD) in-house laboratories would be used as a primary means of carrying our Defense Department programs; (2) delegating greater decision-making authority to the laboratory directors; (3) solving the many administrative difficulties that prevented laboratories from being as effective as they should be; and (4) establishing clear lines of technical management and responsibility for each in-house laboratory.

Just as Task 97 was completing its report, the Bureau of the Budget began organizing an interdepartmental task force to study the problems of government contracting for R&D. This activity, which must be familiar to most of you, became the first broad Executive Branch Policy on R&D activities in the history of this country.

This "Bell Report,"[1/] superimposed upon the Department of Defense findings, placed even greater emphasis on taking constructive actions in many areas. In fact, the Bell Report specifically cited this task force's activities as an appropriate procedure to follow.

On 30 March 1963, the Director of Defense Research and Engineering, reconstituted "Task 97" as the "Task 97 Action Group," in recognition of the fact that strengthening the in-house laboratories "is not only a matter of study but one of action." Its concept of operations was to establish a

1/ Bureau of the Budget (David E. Bell, Director). Report to the President on Government Contracting for Research and Development, 30 April 1963.

core of permanent members, generally six, with the responsibility for its continuing operation. These members were from ODDR&E staff and from the Office of the Assistant Secretaries (R&D) of the Military Departments. Additional members, problem-area specialists, were to be added, depending upon the problem being examined. Also every level of management was represented in all visits to laboratories so that, as a problem was raised, we could follow the problem up the chain of command on the spot and either obtain an immediate solution or find a basis for pinpointing an individual for action. It also provided a rare opportunity to communicate the rationale behind many decisions to the people directly affected--the laboratory personnel.

The "Task 97 Action Group" dealt with many administrative problems affecting the creative climate of laboratories. Listed below are several example of the actions which resulted from the activities of the Group:

. Important input, based upon specific examples, was provided to the Civil Service Commission, and thus had direct influence upon many features of the Salary Reform Act of 1962 and subsequent legislation.

. Some relief was obtained for laboratories in securing foreign periodicals and scientific equipment vis-a-vis the gold-flow problem.

. Security review of scientific papers was delegated to the laboratory level.

. New policies relating to air-conditioning equipment for laboratories, treating them the same as any other type of technical equipment, were established.

. There were more favorable interpretations of the Government

Employees Training Act, 7 July 1958, particularly in the restrictions on the 1-year-in-10 rule.

. The need for some relief in the rigid manpower ceilings to enhance training and career development was dramatized. This is now represented by central pools of manpower spaces and dollars to support technical training, without hampering laboratory operations.

. Block funding or "core funding" of Air Force laboratories in Research and Exploratory Development.

Special Assistant for Laboratories

During 1964 it became increasingly apparent that the Task Force approach to handling "The Laboratory Problem" had about run its course. A consensus was developing to the effect that the in-house laboratories lacked meaningful problems, management stability and prominence, and recognition, and they also failed to impact at the highest policy levels. While administrative improvements were valuable and should be pursued diligently, they were not considered, in themselves, sufficient to make laboratories effective tools of the organizations they served.

A position of "Special Assistant for Laboratories" was created in the Office of the Deputy Director, Research and Technology to assist in planning the future of the DoD laboratories and to develop policies concerning their operations. The functions for this position were stated in the form of a series of questions:

1. On what scientific and technical efforts should the Department of Defense put its greatest effort? Its least?

2. What laboratories are to be expanded or upgraded for the foreseeable future?

3. Are any to be phased out or discontinued?

4. What new laboratories should be created? Or what missions of existing laboratories should be changed significantly?

5. How should the laboratories be organized?

6. How should laboratories interact with other RDT&E performance and the decision-making process?

7. What administrative reforms are needed for laboratories?

It is the answers to questions such as these which make it possible to set priorities, to plan laboratories' expansion and construction on an orderly basis and to relate them to programs, money, people, workloads and facilities.

As a result of the initial studies recommending new organizational concepts for Defense laboratories, Dr. Brown, then the Director of Defense Research and Engineering, currently the Secretary of the Air Force, formally established the Office of Laboratory Management in 1965.

Organizational Relationships of Defense Laboratories

I think that we must first establish the relationship between DDR&E and the in-house laboratories before we can discuss functions of the Office of Laboratory Management in a meaningful way. Almost without exception, the in-house laboratories are organizationally integrated into the Service structures, some at high levels, such as the Naval Research Laboratory, others at relatively low levels like the Army's Night Vision Laboratory at Fort Monmouth. None of these laboratories have a direct line relationship with DDR&E. Their financial support is derived from the programs approved by DDR&E but the operation of these laboratories is under the control of the Military Departments. Each of the Military Departments has a Director of Laboratories, or equivalent, who

is directly responsible for the quality and productivity of his Service's laboratories. Each Director of Laboratories has ready access to his Assistant Secretary (R&D) who sets the over-all RDT&E and laboratory policy for his Service.

Because of the importance of Service laboratories in carrying out the Defence RDT&E mission and related activities, DDR&E plays a vital role in establishing the policies and objectives for these organizations. These are placed into effect by the Assistant Secretaries (R&D) and the Directors of Laboratories. They also utilize the laboratories as a source of expertise and advice in the decision making process.

DDR&E is directly involved in many activities affecting the RDT&E of two or more Services, however. Also, his duties include the "directing, controlling, assigning, and reassigning research and engineering activities that the Secretary considers needs centralized management". The area of laboratory management has been designated by the Secretary as requiring DDR&E's attention and concern.

Functions

The Office of Laboratory Management is the organizational arm of DDR&E with respect to in-house laboratories. Our primary purpose is to assist DDR&E in the planning and the execution of a positive program which assures that the Defense Laboratories of the future play key roles in shaping, carrying out, and administering the complex RDT&E programs upon which our Defense posture depends so heavily. An important aspect of this is to see that laboratories are intimately involved in the mainstream of urgent Defense needs, providing the solutions to vital problems and offering

technical judgments highly relevant to the needs of top level planners and decision-makers.

While these words may at first sound much too general to have much meaning, they truly represent the goals and the "job description" for the office. It interacts on a continual basis with the Service Directors of Laboratories and with the Offices of the Assistant Secretaries (R&D). It is considered the "Washington Representative" of the in-house laboratories and it tries to represent their positions and points of view at the corporate level. It is a "champion" for laboratories within the DoD.

The scope of activity varies from minutia to major problems directly affecting the productivity of technical organizations. During the earlier phase of its development it concentrated on the development of a quantitative data base for laboratories which would give DDR&E insight into current and planned operations of these organizations and to provide a sounder basis for action. Working with our Army counterparts, it assisted in the development and approval of an Army 10-year plan for its laboratories. Its activities in refining the "weapon center concept" helped the Navy develop and place into operation an organizational plan, which we expect will pay many important dividends in the future of the Navy. Its close working relationships with the Air Force has resulted in a number of innovations which have strengthened the Air Force's in-house capability. Much of its effort is motivational and indirect. An important role is acting as the "conscience" of the R&D community of the DoD, the pre-testers of new ideas and innovations about laboratories.

It is the focal point for special studies aimed at improving the productivity, environment and utilization of laboratories. As a result of its recommendations, a number of laboratories has been phased out, consolidated or rejuvenated. It has been the interface with the Civil Service Commission in attempting to set the required personnel climate for technical organizations. It has played an important part in helping to define the role of laboratories in transition of laboratory-developed systems and equipment from development to production. These are but a few examples of the kinds of activities in which it is involved.

We should not leave the impression that the Office of Laboratory Management is the sole source of improvements in our in-house laboratory system, as this is far from the truth. It takes many people and organizations to achieve the goals established for improving the DoD laboratories. Its principal job is to provide the required degree of leadership and "coaching" which will assure that we are going in the right direction and at the proper pace.

Progress in the solution of laboratory problems has been gratifying during the past two years. Solutions to problems once thought to be unattainable are on the horizon, or well in hand. We seem to have gained a great deal of momentum particularly in the past six months which will have tremendous impact upon our Defense capabilities in the years ahead. It is the job of the Office of Laboratory Management to see that our progress continues.